PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 35010/142WO	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US 03/27126	International filing date *(day/month/year)* 29.08.2003	Priority date *(day/month/year)* 29.08.2003
International Patent Classification (IPC) or both national classification and IPC G01F25/00		
Applicant MICRO MOTION, INC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
21.03.2005	08.11.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Fenzl, B Telephone No. +49 89 2399-2783

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US 03/27126

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-34 as originally filed

Claims, Numbers

1-14 as originally filed

Drawings, Sheets

1/14-14/14 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-14
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Problem:
The time delay of a Coriolis flowmeter at zero flow is never constant (= zero drift) which can cause an erroneous flow rate output signal.

Solution:
An adaptive changing set of deviation limits is created that track a spurious flow signal generated by the flowmeter during its zero flow state. If a data point falls between the upper and lower deviation limits, processing circuitry determines that the flowmeter is still in the zero flow state and the sampling continues. If a defined data point is not between the deviation limits, the processing circuitry of the present invention determines that the flowmeter is no longer in a zero flow state and that the sampled flow signal has a magnitude indicative of a true material flow. The processing circuitry then causes the flowmeter to generate an output signal.

The solution is new and not rendered obvious by the documents of the search report.

Prior Art:
US 5,228,327: discloses a Coriolis flowmeter for measuring and updating a mechanical zero value for the meter using only zero flow measurements that have a sufficiently low noise content. Specifically, the meter produces zero flow measurements while no fluid is flowing through the meter. If a standard deviation of these zero flow measurements is less than a pre-defined limit value, then a resulting mechanical zero value, based on those measurements, is subsequently subtracted from the flow based measurement data. Meter electronics switches between "zeroing" and "measuring" mode.

US 5,827,979: deals with problem of zero drift effects with changing boundary conditions and fluid parameters. Disclosed are apparatus and methods for determining the true mass flow related component of the signal of the meter separately from errors caused by changing boundary conditions and fluid parameters. I.a. an output circuitry is disclosed for producing an output signal proportional to the mass flow rate, the output signal substantially free of influence from the boundary condition mode component of the

sensed motion signal.

US 6,327,915: discloses a Coriolis flowmeter with meter electronics performing program instructions to compensate output data.

GB 2 272 287: discloses a fluid flowmeter for measuring rates of flow higher than a preset rate by means of a fluidic element and lower than a preset rate by means of a flow sensor, a method for zero point correction of the flow sensor wherein the maximum value of the permissible shift is set as a threshold value TH and the number of output pulses Po is assumed to be the zero point of the flow sensor for establishing the shift only when the actual value of flow sensor output P is less than the said threshold value and wherein if the number of output pulses is greater than the threshold value, the shift value is not updated assuming that there has been a flow, and the flow rate is corrected by use of the value available at that time.

US 5,983,700: discloses a method of calibrating a zero point of a flow sensor includes the steps of detecting a transition of output of the flow sensor caused in response to a shut down of a fluid, and adjusting the zero point of a characteristic curve representing the output of the flow sensor and a flow rate, such that the indicated flow rate is zero immediately after the transition of the flow sensor output.

Certain observations on the international application (clarity of the claims):

Claims 1 and 13:
It is not clear whether the processing system is part of the meter electronics, or whether it is part of the measurement apparatus.

It is furthermore not clear which single inventive concept links claims 1 and 13.

Claim 1:
It is not clear what 'correcting flow information' means, in particular, it is not clear whether the steps of claim 1 described in lines 4 to 23 are part of this flow information correction, or not.

Lines 4 to 23 of the claim contain rather method steps than apparatus features. The meter electronics is not defined by any means or apparatus features which renders the scope and category of the claim unclear.

It is not clear when and how the deviation limits are established.

It seems that essential features of the invention are missing:
- a cut-off value and the step of deciding whether the flow signal is below cut-off value, or not (see Fig. 5, step 503 and Fig. 12, step 1208) ? This decisions appears to be a necessary prerequisite to the determination of the deviation limits (Fig. 5 step 504, Fig. 12, step 1208), otherwise it is not clear what triggers the establishing of the deviation limits.
- the establishing of the deviation limits appear to be based on algorithms which seem to involve the actual inventive idea. These algorithms, however, are neither described in claim 1 nor are they clearly described in the dependent claims.
- creating an adaptively changing set of deviation limits that track a spurious flow signal generated by the flowmeter during its zero flow state, this feature appears to absolutely necessary, otherwise it is not clear how the problem of the invention can be solved (see description p. 3 below to p. 4 above). In order to understand how this adaption is performed again it seems to be necessary to clearly describe the underlying algorithm (see also above).

Claim 13:
Lines 17 (p. 38) and 1 to 12 (p.39) of the claim contain rather method steps than apparatus features. The meter electronics is not defined by any means or apparatus features which renders the scope and category of the claim unclear.

The phrases "derive an expression" in lines 5 and 8 on p. 38 and the resulting step "subtract said expressions..." are so vague that they also render the scope of the claim unclear.

The meter electronics is not related to a specific flow measurement principle. Therefore, the expressions 'time delay' and 'input power' are completely unclear.

Claim 14:
The step 'establishing deviation limits' are too vague and renders the scope of the claim

unclear.

It is, in particular, not clear when and how the deviation limits are established.

It seems that essential method steps of the invention are missing:
- a cut-off value and the step of deciding whether the flow signal is below cut-off value, or not (see Fig. 5, step 503 and Fig. 12, step 1208) ? This decisions appears to be a necessary prerequisite to the determination of the deviation limits (Fig. 5 step 504, Fig. 12, step 1208), otherwise it is not clear what triggers the establishing of the deviation limits.
- the establishing of the deviation limits appear to be based on algorithms which seem to involve the actual inventive idea. These algorithms, however, are neither described in claim 1 nor are they clearly described in the dependent claims.
- creating an adaptively changing set of deviation limits that track a spurious flow signal generated by the flowmeter during its zero flow state, this feature appears to absolutely necessary, otherwise it is not clear how the problem of the invention can be solved (see description p. 3 below to p. 4 above). In order to understand how this adaption is performed again it seems to be necessary to clearly describe the underlying algorithm (see also above).